

Feline Diabetes

Current Knowledge
& Modern Management

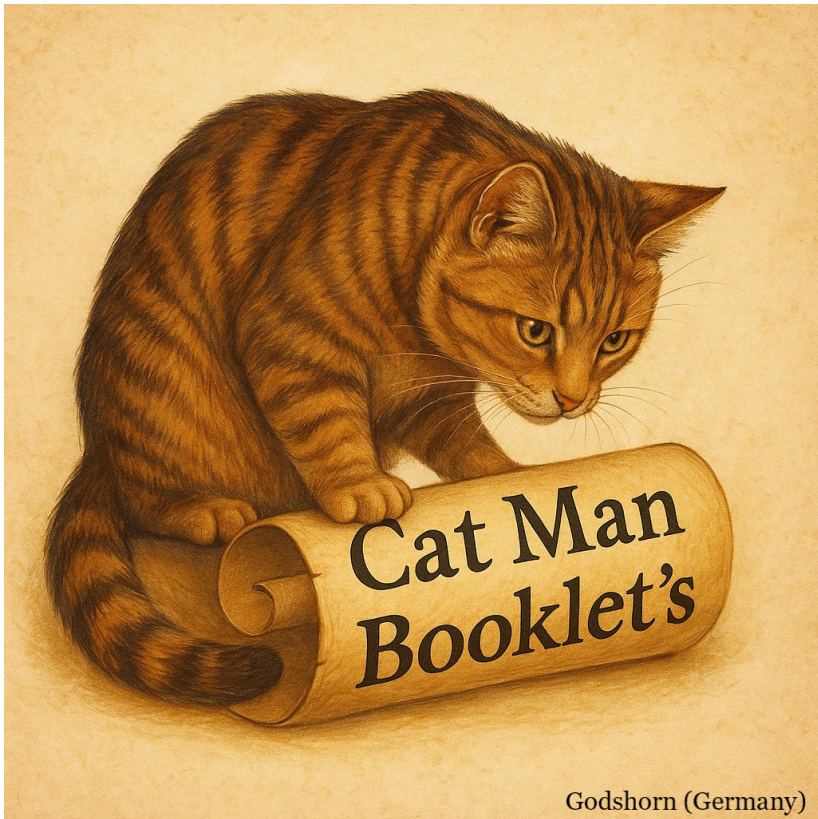


Cat Man (Booklet's)

Feline Diabetes

Current Knowledge & Modern

Management



Godshorn (Germany)



Blood Draw at the Veterinary Clinic

Chapter 1

Fundamentals and Pathogenesis of Feline Diabetes Mellitus

Feline diabetes mellitus is among the most common endocrine disorders in cats, and its prevalence continues to rise. It is characterized by persistently elevated blood glucose caused by either an absolute or relative lack of insulin or by an inadequate response to insulin. While dogs usually develop an absolute insulin deficiency similar to human type 1 diabetes, feline diabetes resembles human type 2 diabetes in most cases, marked by relative insulin insufficiency and peripheral insulin resistance.

This leads to chronic hyperglycemia and the classic clinical signs. A clinically important aspect is the high potential for remission: with early and consistent treatment, many cats regain enough endogenous insulin production to discontinue external insulin. Achieving remission is therefore a central therapeutic goal.

The pathophysiology of feline diabetes results from several interacting mechanisms. A key factor is the deposition of amyloid in the pancreatic islets. This material is derived from amylin, a hormone normally produced in physiological amounts but increasingly released when beta cells are chronically overworked.

Amylin antagonizes insulin, promotes insulin resistance, and contributes to structural destruction of beta cells when deposited as amyloid. Persistent hyperglycemia also causes marked glucotoxicity. Chronic high glucose levels damage beta cells both functionally and structurally, though this damage remains reversible in early stages—one reason why timely therapy can achieve remission.

Several risk factors contribute to the development of feline diabetes. Excess weight is the most important modifiable factor and is widespread among domestic cats. Obesity leads to significant peripheral insulin resistance and places additional stress on beta cells, accelerating disease progression. Genetic influences also play a role; certain breeds, especially the Burmese, show increased susceptibility and higher baseline fasting glucose levels. Medications such as glucocorticoids can also induce diabetes, making a thorough medical history essential.



Insulin Injection at Home

Chapter 2

Diagnostic Challenges and Modern Monitoring

The diagnosis of feline diabetes mellitus is initially based on the typical clinical signs: increased drinking, increased urination, heightened appetite, and simultaneous weight loss. In overweight cats, however, these symptoms can remain hidden for a long time, leading to frequent diagnosis at a more advanced stage. Confirmation requires documenting persistently elevated blood glucose together with glucose in the urine. Single blood glucose measurements are only of limited reliability in cats, since many develop significant stress-induced hyperglycemia during a veterinary visit.

To avoid such stress-related distortions, serum fructosamine levels are measured. Fructosamine is a glycated protein reflecting the average blood glucose level of the past one to three weeks. Because fructosamine is unaffected by acute stress responses, it is an excellent tool for distinguishing true diabetes from stress hyperglycemia.

If uncertainty remains, repeated fructosamine measurements or blood glucose curves are recommended, ideally created by the owner at home. Home measurements are far less stressful for cats and therefore much more reliable than curves performed in a clinic.

Continuous glucose monitoring has significantly advanced diabetes management in recent years. Systems such as the FreeStyle Libre sensor measure glucose in the subcutaneous tissue, which closely correlates with blood glucose. The sensor is placed under the skin, requires no calibration, and remains active for several days to weeks. Most cats tolerate it well.

Continuous monitoring provides hundreds of data points per day, enabling complete daily profiles and revealing trends, rapid rises, or impending drops early on. This allows for safer and more precise adjustments of therapy, while reducing stress for owners who no longer need frequent blood sampling.

Home monitoring of blood glucose by the owner is a crucial component of diabetes management. Insulin requirements can vary considerably over time, making regular monitoring essential. The goal of blood glucose control is to reduce or eliminate clinical symptoms while avoiding dangerous hypoglycemia.

Under treatment with insulin glargine, the daily profile should remain relatively stable, with a maximum around 150 mg/dl and a nadir around 80 mg/dl. Values down to 70 mg/dl at the lowest point are generally acceptable. Adjustments to the insulin dose must be made carefully and usually fall within 0.5 to 1 international unit per injection, depending on the measured values and the cat's clinical condition.



Applying a Glucose Sensor

Chapter 3

Evidence-Based Pillars of Therapy

The primary therapeutic goal in feline diabetes is achieving remission whenever possible. Remission means restoring sufficient endogenous insulin production so external insulin is no longer required. This depends on early and consistent treatment to rapidly reduce glucotoxicity and give the remaining beta cells the opportunity to recover. Nutrition is a central component of management. A high-protein, low-carbohydrate diet is recommended because cats, as obligate carnivores, are adapted to such a composition.

High protein levels and limited rapidly available carbohydrates reduce postprandial glucose spikes and improve insulin sensitivity. Wet food is often advantageous, as it is naturally lower in energy density and its high moisture content promotes faster satiety. Overweight cats also require controlled weight loss to reduce insulin resistance, but the rate of weight loss must be slow enough to prevent hepatic lipidosis. A reduction of about one percent per week is considered safe. Environmental enrichment such as food puzzles or feeding balls can help slow food intake and increase activity.

Insulin therapy forms the foundation of treatment for most cats, at least in the initial phase. The goal is to break glucotoxicity as quickly as possible and stabilize blood glucose control.

Long-acting insulins such as glargine, detemir, or protamine zinc insulin have proven especially effective. Insulin glargine often yields the highest remission rates in studies because it provides a very steady daily glucose profile. Proper dose adjustment requires close monitoring, preferably through home testing or continuous glucose monitoring. Effective glycemic control is the basis for successful remission.

Long-term remission is influenced by several factors. Early treatment is the most important; cats whose diabetes has been present for less than six months have significantly better chances of achieving insulin independence. Managing concurrent conditions is also essential, as inflammation increases insulin resistance and further strains the beta cells. Any signs of inflammatory disease must be thoroughly investigated before insulin therapy is started or adjusted.



Glucose Curve / Monitoring on a Smartphone

Chapter 4

Pharmacological Management and Optimization of Insulin Therapy

Insulin therapy is essential for most diabetic cats at the beginning of treatment because it rapidly reduces existing glucotoxicity and allows the beta cells to recover. Long-acting insulin preparations such as glargine, detemir, or protamine zinc insulin are particularly effective, as they create a more even daily glucose profile and minimize fluctuations in the blood glucose curve. Numerous studies show that insulin glargine offers a high chance of remission in newly diagnosed cats. It typically results in more stable glucose control and significantly improves the overall prognosis.

The likelihood of long-term remission depends on several factors, with the time between onset and the beginning of treatment being the most decisive. Cats whose diabetes has existed for less than six months respond far better to therapy. Early, consistent, and closely monitored treatment increases the chances of preserving or restoring endogenous insulin production.

A structured dosing protocol, usually involving twice-daily injections and intensive home monitoring, further improves outcomes. Blood glucose levels should be kept within a range that ensures sufficient control without increasing the risk of hypoglycemia.

For remission induction, the aim is usually a maximum blood glucose level of about 250 mg/dl with a nadir around 80 mg/dl.

Concurrent diseases must be identified and treated promptly, as they worsen insulin resistance and further damage the beta cells. Signs of systemic inflammation, such as elevated acute-phase proteins, may indicate pancreatitis or other chronic inflammatory conditions. Comprehensive diagnostics before initiating therapy are therefore essential to avoid complicating the course of disease and to optimize the chance of remission.



CatFood
LOW CARB



Chapter 5

Innovation in Therapy

SGLT2 Inhibitors

In recent years, a new class of oral antidiabetic drugs has become established for certain cats: the SGLT2 inhibitors. Agents such as bexagliflozin and velagliflozin block the sodium–glucose co-transporter 2 in the renal tubules. This transporter normally reabsorbs glucose from the primary filtrate back into the body. When it is inhibited, more glucose is excreted in the urine, leading to an effective reduction in blood glucose levels. These medications are suitable only for newly diagnosed type 2 diabetics that still produce their own insulin.

Bexagliflozin is given once daily as a flavored tablet, while velagliflozin is available as an oral solution administered daily. Studies have demonstrated good efficacy, and many cats show marked improvement in clinical signs and blood glucose values. Because the SGLT1 transporter continues to reabsorb a substantial portion of filtered glucose, the risk of hypoglycemia with this therapy is comparatively low.

Despite these advantages, SGLT2 inhibitors carry a serious risk: euglycemic diabetic ketoacidosis. This life-threatening complication is characterized by ketosis and acidosis while blood glucose levels may appear normal or only moderately elevated.

Increased urinary glucose loss creates a relative carbohydrate deficit within the body, driving fatty acid breakdown and significantly stimulating ketogenesis. Cats that previously received insulin, as well as those experiencing poor appetite, dehydration, fasting, concurrent illness, or a very low-carbohydrate diet, are at heightened risk. Early signs may include loss of appetite, lethargy, vomiting, or sudden weight loss. In such cases, the medication must be stopped immediately and veterinary care sought without delay.

Careful patient selection is therefore essential. Cats that have ever received insulin or are clinically unstable must not be treated with SGLT2 inhibitors, as their risk of ketoacidosis is significantly higher. Owner education also plays a central role. They must know precisely which symptoms require urgent attention and when immediate veterinary evaluation is necessary.

Because blood glucose values may appear misleadingly normal due to glucosuria caused by the medication, monitoring should also assess the metabolic state, for example through regular checks for ketone bodies in the urine. Non-absorbent litter can help with collecting urine samples.

Despite the possibility of severe side effects, studies show that the overall mortality rate with velagliflozin is comparable to that of Caninsulin. Prognosis depends greatly on early recognition of risks and consistent, close monitoring.

For carefully selected patients, SGLT2 inhibitors can provide an effective and well-tolerated alternative, as long as their use follows strict protocols.





Food Weighing for Diabetic Cats

Chapter 6

Future Therapeutic Approaches and Research

Current research on feline diabetes mellitus increasingly focuses on protecting or regenerating beta-cell function and addressing insulin resistance at its roots. One promising direction is the development of GLP-1 analogs. These agents mimic the natural incretin hormone GLP-1, which is released after food intake and enhances insulin secretion in a glucose-dependent manner. GLP-1 analogs increase the sensitivity of beta cells to glucose, support insulin biosynthesis, and may reduce beta-cell apoptosis.

They also show potential to promote beta-cell proliferation. Because their effects are glucose-dependent, the theoretical risk of hypoglycemia is lower compared with insulin preparations. Non-peptidic GLP-1 receptor agonists are currently being actively investigated for veterinary use and may play an important role in future treatment strategies.

Another area of research focuses on the influence of the gut microbiota. Disruptions in microbial composition, known as dysbiosis, have been associated with metabolic changes in both human type 1 and type 2 diabetes. In human type 2 diabetes, transferring healthy gut microbiota through fecal transplantation has shown that bacterial diversity can be restored and insulin sensitivity improved, at least temporarily.

Interest in this approach is growing in feline medicine as well. Early case reports suggest positive effects of fecal transplantation in cats with chronic gastrointestinal disease. However, whether this method can improve insulin resistance or support beta-cell function in diabetic cats remains unknown and requires controlled clinical studies.

The future of feline diabetes therapy will likely combine classical approaches with new, targeted treatments. While insulin therapy, dietary management, and weight control will remain essential, innovative options such as GLP-1 analogs or microbiome-based interventions could expand therapeutic possibilities and further improve long-term stability or remission outcomes in diabetic cats.



Insulin-Therapieplan

Morgen	Abend

Veterinarian Explains the Treatment Plan

Chapter 7
Conclusions and Clinical
Decision-Making

Feline diabetes mellitus is a complex endocrine disorder whose treatment has been significantly improved by modern diagnostic methods and therapeutic advances. A central focus is the early and consistent reduction of blood glucose levels to protect beta cells from irreversible damage. Accurate diagnosis is essential, as stress-induced hyperglycemia is common in cats and can complicate the interpretation of single measurements.

Determining fructosamine levels, together with home blood glucose testing or continuous glucose monitoring, helps avoid misinterpretation and provides a precise picture of the cat's metabolic status.

Therapeutic decisions center on the goal of remission whenever it is realistically achievable. Early initiation of insulin therapy, ideally with long-acting preparations such as insulin glargine, offers the best chances for reducing hyperglycemia and allowing functional recovery of beta cells.

A high-protein, low-carbohydrate diet and, when necessary, controlled weight loss support this process and help improve insulin resistance. New oral therapies such as SGLT2 inhibitors provide additional options for newly diagnosed type 2 diabetics but require strict patient selection and intensive monitoring to minimize the risk of severe complications such as euglycemic ketoacidosis.

Close monitoring of glycemic parameters, ideally through home testing or modern glucose sensors, is essential for therapeutic success.

Equally important is the prompt treatment of concurrent diseases and close cooperation between veterinarian and owner. Through this combination of accurate diagnostics, individualized therapy, and modern monitoring, the quality of life, stability, and long-term prognosis of many diabetic cats can be markedly improved.



Diabetes Essentials – Equipment Overview

For your notes

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